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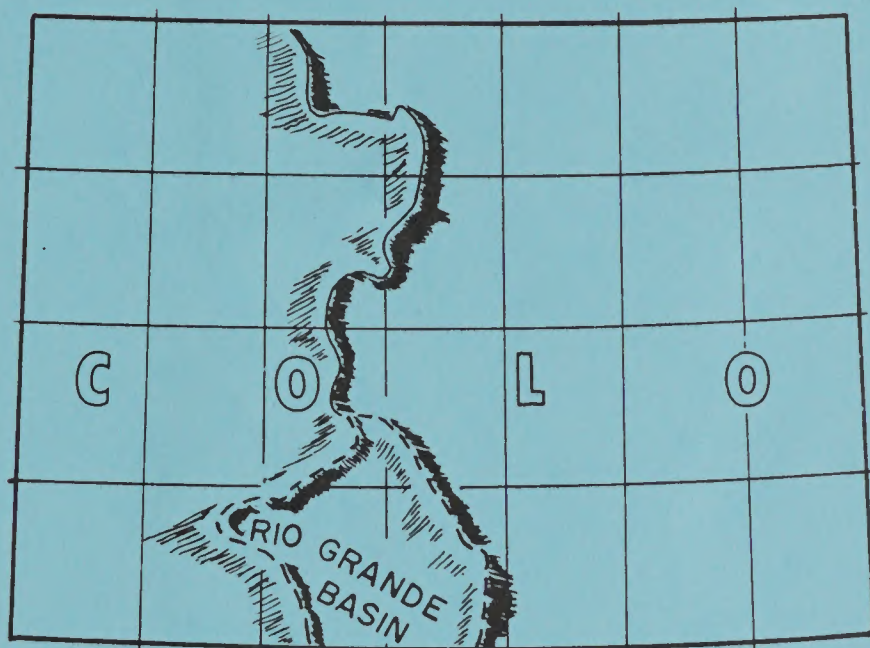


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PLAN OF WORK-TYPE IV SURVEY

# RIO GRANDE BASIN COLORADO

JUNE, 1972



PREPARED BY

UNITED STATES DEPARTMENT OF AGRICULTURE

ECONOMIC RESEARCH SERVICE, FOREST SERVICE, SOIL CONSERVATION SERVICE

IN COOPERATION WITH

COLORADO WATER CONSERVATION BOARD



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## INTRODUCTION

The Colorado Water Conservation Board has requested the U. S. Department of Agriculture, under Section 6 of P. L. 83-566, to conduct a Type IV river basin survey in the Rio Grande Basin. The study will develop information that will contribute to efficient coordination and functioning of programs and projects of various departments and agencies in the Basin. Data developed will also be used by the Water Conservation Board in developing Colorado's State Water Plan.

Social, economic, and physical conditions are such that many programs of local, state, and Federal agencies are actively conducted within the Basin. Other programs such as RC&D, USDA Rural Development, etc., are currently under consideration or actively planned. Agricultural, industrial, and urban development has reached the point where further uncoordinated expansion will undoubtedly infringe upon existing ownership rights. Coordination of all activities and programs, while maintaining present water rights and commitments, has created many complex interrelationships and problems. Therefore, the evaluation of opportunities to alleviate these problems must be conducted under a multi-objective planning concept.

The study will address the problem of conserving, developing, and allocating resources among alternative uses so as to maximize net benefits to society. The objectives in planning water and related land resources to reflect society's preference will be:

1. National economic development.
2. Regional development.
3. Quality of environment.

Information from the U. S. Department of Agriculture will fill the gap between farm-by-farm conservation operations information and the large project type information now available or to be made available by the Bureau of Reclamation, Corps of Engineers, RC&D Area, and other Federal agencies. The U. S. Department of Agriculture needs information concerning opportunities and need for development of water and related land resources in sub-watersheds of 250,000 acres or less within the Basin for development by local organizations with assistance from the Department under the provisions of the Watershed Protection and Flood Prevention Act (P. L. 566, 83d Congress, as amended) and the protection and development of national forest resources of the Basin.





## DESCRIPTION OF BASIN

The Rio Grande Basin in Colorado lies in the south central part of the State (see accompanying map). It encompasses all or parts of nine counties: Mineral, Hinsdale, Saguache, Rio Grande, Alamosa, Archuleta, Conejos, San Juan, and Costilla. It is more than 7,500 square miles in area. It is about 140 miles in length east to west and nearly 100 miles north to south. The Basin opens to the south in New Mexico. It is bounded on the west and north by the San Juan Mountains and other lesser ranges of the Continental Divide. On the east it is bounded by the Sangre de Cristo Range. Included is that part of the San Luis Valley locally known as the "Closed Basin" encompassing approximately 3,000 square miles without a defined surface outlet and isolated from the Rio Grande drainage by a low-lying ridge several miles in width.

Precipitation varies from more than 50 inches in the high mountains to about eight inches in the San Luis Valley. Average annual snowfall ranges from about 28 inches in the valley to more than 400 inches on the higher mountain peaks. Growing seasons in the valley range from 100 to 110 days for more hardy crops such as grains, hay and pasture, and 80 to 90 days for less hardy vegetable crops. Frost-free seasons fluctuate widely from the averages and have been recorded less than 30 days. Valley soils are predominantly coarse to medium textured underlain by sands and gravels with finer textured silts and silty clays appearing in lower areas in the center of the Closed Basin.

Distribution of landownership in the Basin is approximately as shown in the following tabulation:

:	:	:	:	:	:	:	:
:	:	:	National	:	:	:	:
:	Private	: State	: Wildlife	:National	: National	: Public	:
:	Land	: Land	: Refuges	: Parks	: Forest	: Domain	:TOTAL
:	:	:	:	:	:	:	:
Acres	2,214,100	226,300	23,900	36,700	1,799,900	516,000	4,816,900
% of Basin	46.0	4.7	0.5	0.8	37.3	10.7	100.0

The population of the Basin is close to 40,000 which is a decline of approximately 14 percent over the past 20 years. Forty-four percent of the people in the Basin live in cities and towns, and 56 percent are rural dwellers. Of the slightly more than 1,800 farms only 12 percent are tenant farmed. The area of the Basin is about eight percent of the area of the State and the population is about two percent of the State's population.





Agricultural crop production, livestock, mining, timber processing, manufacturing, construction, services, tourism, and outdoor recreation are the basic economic activities of the Basin. Crops produced are small grains, hay and pasture, potatoes, and vegetables. About one-half of the Basin is forest land and of this about 80 percent is in national forest. The timber and associated wood products industries are important components of the Basin's economy. The Rio Grande National Forest and other forest lands provide outstanding recreational resources. Visitors are attracted the year around by the scenic beauty and the camping, hunting, fishing, hiking, trail riding and winter sports opportunities. Some of the major recreation attractions are: the Wheeler Geologic Formations, the La Garita Wilderness Area, the Upper Rio Grande Primitive Area, the Great Sand Dunes National Monument, and the Monte Vista and Alamosa National Wildlife Refuges.

The Basin is served by a good network of State and Federal highways running both north to south and east to west. Commercial bus and trucking services are available to all cities, towns, and communities. Rail services include the Denver and Rio Grande Western, the San Luis Central and the San Luis Valley Southern. Commercial and private air services are available to the more populated centers.

Land use problems have evolved from the interrelation of customs, climate conditions, topography, and soil variability. Over a long period of irrigated agricultural development, complex water rights and water use problems have arisen which have been further complicated by the Rio Grande Compact which divides the waters of the Rio Grande between Colorado, New Mexico, and Texas. The remoteness of the Basin from major trade centers has influenced the composition of manufactured goods, marketing of produce, services and industrial output.





## STATUS OF WATER AND RELATED LAND RESOURCE PROGRAMS

There are 755 operating irrigation systems in the Basin serving 3,968 water users. The Basin is covered almost entirely by the Rio Grande Water Conservation District which was created by the Colorado General Assembly for the conservation, use, and development of the water resource of the Rio Grande and its Colorado tributaries. In addition, there is the Conejos Water Conservancy District, organized to develop Platoro Dam, and the San Luis Valley Water Conservancy District, organized to develop Wagon Wheel Gap Dam.

Six Soil Conservation Districts cover almost the entire area of the Basin. The Soil Conservation Districts assist individual farmers, ranchers, and organized groups in soil and water conservation and related resources development. The Soil Conservation Service is giving active assistance to the Colorado, ASCS, all SCD's, the San Luis Valley RC&D, sponsors of PL 566 measures, Great Plains Conservation Program participants, State and local governments and other State and Federal agencies. The SCS has prepared a Water Management Study for the Four Corners Regional Commission. All counties in the Rio Grande Basin have applied to the Secretary of Agriculture for planning authorization for an RC&D Project and are presently developing a plan with local resources.

All of the Rio Grande National Forest is located in the study area. The Upper Rio Grande Primitive and the La Garita Wilderness Areas are managed under the provisions of the Wilderness Act, Public Law 88-577 (1964). Other lands under National Forest Administration are managed for the sustained-yield multiple use benefits of range, timber, recreation, water and wildlife.

The U. S. Bureau of Reclamation is active with several existing and proposed diversion, storage, irrigation, and reclamation projects. The U. S. Corps of Engineers is or has been involved with flood protection and channel improvement measures. The U. S. Bureau of Sport Fisheries and Wildlife and the Colorado Game, Fish and Parks Division are involved with fish and wildlife management and migratory waterfowl habitat improvement. The Bureau of Sport Fisheries and Wildlife manages two National Wildlife Refuges in the Basin. The Southern Colorado Economic Development District (SCEDD) is assisting counties, cities, and the citizenry to mutually work together to plan, to promote, and implement programs and projects to accelerate the growth and development of the area.





## PROBLEMS AND NEEDS

### Water Resources

An analysis of uses, demands, and supplies of water is needed as a base for planning.

Rio Grande Compact water commitments and over-appropriation of water in the Basin has resulted in restrictions on additional water uses and developments. As a result economic development through industrial growth and diversification is limited.

There are serious inefficiencies in the current use of irrigation water.

Existing water reserves are inadequate for late season uses or for drought periods.

Drainage of irrigation waters is inadequate. Extensive areas of cropland are water-logged by undrained irrigation waters.

Return flows of irrigation water are often high in dissolved solids. Salinity of receiving streams is increased beyond acceptable levels.

Natural stream pollution from dissolved solids and minerals is a problem. Natural high acidity is especially severe in the Alamosa River. In some streams irrigation return flows compound the problem.

### Land Resources

Erosion and sediment production is a problem on some crop and forest lands.

Indiscriminate off-road travel by survey crews, mineral exploration teams, recreationists, and others is causing erosion and other environmental problems.

Inefficient management and inappropriate agricultural land uses is a problem.

Overgrazing on some range and forest land is a serious problem with physical economic, and environmental implications.

### Socio-Economic

The basin is in one of the most economically depressed areas of the State. Incomes are low, unemployment is high, and opportunities are limited by lack of economic diversity.





Timber resources are underutilized because of difficulty of access, high costs of production and a lack of processing plants.

Agricultural producers are having, and will have, adjustment problems due to changing prices, cropping patterns, and investment needs. Small scale farmers may need governmental help in expanding their farm operations or in phasing out their operation (and seeking other means of obtaining an income).

Displaced farm labor and capital will need aid in the transition to other phases of the economy within and outside the Region.

### Environmental Quality

Air and water quality is generally good. The problem is maintaining this desirable condition while encouraging economic development.

### Recreation Use

The Basin is a popular area for recreation use, particularly for out-of-state visitors. Increasing recreation use is damaging the physical environment in many areas. There is a need to control, direct, and coordinate recreation use.

Functional relationships of demand and project development need to be defined.

Increasing use needs to be reconciled, through planning, with maintenance of a high-quality experience.

Wildlife problems include underutilization of elk and scarcity of winter range for deer and elk.

Competition between domestic livestock and wildlife is a problem on some forest and mountainous areas.



## OBJECTIVES, SCOPE, AND EXPECTED RESULTS

The purpose of this river basin survey will be to develop alternative plans for the use, management, and development of water and related land resources to reflect society's preference for attainment of the following objectives:

1. To enhance national economic development (NED) by increasing the value of the Nation's output of goods and services and improving national economic efficiency.
2. To enhance the quality of environment (EQ) by management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems.
3. To enhance regional development (RD) through increases in a region's income, increases in employment, and improvements of its economic base, environment, quality of life, and other specified components of the regional objective.

Specific objectives of the survey will be developed during Phase I of the Plan Formulation Process. These objectives may be modified as the study progresses and as the needs of the people in the Basin become more fully understood.

The scope of the investigations will be broad enough to consider on a preliminary basis an appropriate range of alternatives including possible variances from existing provisions of federal and state law, different levels of development, timing and priority of action, and land use regulation or change. These alternatives will be evaluated using the multi-objective evaluation procedure. Watersheds appearing to have problems appropriate for solution under PL-566 or RC&D, will be studied in sufficient depth to determine the approximate beneficial and adverse effects. The study report will be presented in the multiple objective accounting system and will provide a general overall Basin appraisal of water, land, and plant resources and their potentials in an intensity and detail sufficient to serve as a guide for more detailed plans. Any apparent conflicts of resource management, development, and use will be pointed out. Close coordination with State agencies and others will be made to avoid duplication of effort.

In delineating the contribution of resource development to the societal objectives, the results of the surveys will provide:

1. An inventory of the resources of the Basin identifying the present and potential land and water problems and opportunities for solving them.





2. Basic resource information that can be used by planners and decision makers for more effective coordination of resource development with other federal, state, and local agencies.
3. Criteria or standards for assessing the relevance and sufficiency of projects and programs in pursuit of specified goals.
4. Alternative plans that will contribute to goals that will promote economic growth and development, contribute to current and long-term resource development, and preserve and enhance the quality of the environment and quality of life.
5. A recommended early action USDA plan of projects and programs that provides the best mix of the multi-objective accounts as emphasized by the decision makers.
6. Information for the Colorado Water Conservation Board in developing its State Water Plan and for the Western U. S. Water Plan.





## PLAN FORMULATION PROCESS

Plan formulation, is the continuing process for management, control, and utilization of all other study elements culminating in the development of a plan. It seeks to implement the multiple objectives of planning, establish criteria and guidelines, and bring together the results of the study elements into cohesive alternative courses of action for use in decision making. Through careful monitoring and sensitivity analyses, it provides direction to ensure that information on all important factors are provided in proper balance and sequence and that vital data are available at crucial points of the study.

The growing complexity of water and related land resource planning recognizing environmental, social, and economic needs to meet future demands of an increasing population, requires that formulation of optional courses of action be dynamic, responsive to changing events, and reiterative to permit continuous testing and modifying of alternative plans. This must permit the constant matching of water needs determined in the context of the multiple objectives and the means to satisfy those needs in terms of water related projects and programs.

Needs, problems, resource capabilities and plans developed in other studies will provide the basis for initiating plan formulation studies. This information will be broadened as necessary to incorporate the multiple objective approach to planning.

An array of alternative plans will be formulated to meet future demands derived from a range of economic projections with differing emphasis on one or more of the multiple objectives. This will provide the opportunity to structure and evaluate plans.

The processing of data incorporating the results of the economic evaluation criteria and a systemized appraisal of the environmental and social impacts will result in an array of alternative plans to be presented for official public review. Concurrent with the public review period, there will be a consolidation, modification, and realignment of projects and programs as necessary to complete the formulation of the recommended plan. The plan will present the means to meet future demands derived from a selected set of projections, and will show effects on that plan if that level of projection is reached before or after the time frame considered.

Standards and procedures will be developed for use in the evaluation of alternative plans and in the evaluation and final selection of a general plan. This will include methodology for evaluating beneficial and adverse effects in both monetary and nonmonetary terms in the context of the multiple objectives of planning. An important requirement is the development of a uniform system for classifying, describing, and ranking environmental factors for procedural implementation in planning water programs and projects.



To carry out the Plan Formulation Process it has been broken down into five (5) Planning Phases. These are as follows:

- I. Organize Study
- II. Inventory and Assemble Information
- III. Analyze Information and Formulate Alternative Assumptions Concerning Future Economic and Demographic Conditions.
- IV. Formulate and Evaluate Alternative Plans
- V. Select a Recommended Plan

The Planning Phases are further broken down into major activities with general procedures and USDA agency assignments. These activities and procedures are as follows:





# THE PLAN FORMULATION PROCESS - RIO GRANDE BASIN

MAJOR ACTIVITIES	GENERAL PROCEDURES*
I. Organize Study	
A. Establish objectives, scope and expected results.	<div>ERS (J)</div> <div>Al. Societal objectives will be developed in accordance with MOP procedures.</div> <div>FS (J)</div> <div>SCS (J)</div> <div>CWCB (J)</div>
B. Conceptual analysis of the Basin and data that will be needed.	<div>ERS (J)</div> <div>B1. Specify relationships needed to address objectives determined in Al. Identify methods of analysis, components, and</div> <div>FS (J)</div> <div>SCS (J)</div> <div>ERS (J)</div> <div>B2. Review existing information and reports to determine data available.</div> <div>FS (J)</div> <div>SCS (J)</div> <div>CWCB (J)</div>
C. Prepare plan of work and detailed work outline.	<div>ERS (J)</div> <div>FS (J)</div> <div>SCS (J)</div>
D. Determine personnel and funding needs.	<div>ERS (J)</div> <div>FS (J)</div> <div>SCS (J)</div>
E. Organize personnel and equipment.	<div>ERS (J)</div> <div>FS (J)</div> <div>SCS (J)</div>

\*Assignment responsibility is indicated as primary (P), secondary (S), or joint (J).





## MAJOR ACTIVITIES

## GENERAL PROCEDURES

- |                                          |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F. Develop public participation program. | ERS (J)<br>FS (J)<br>SCS (J)<br>CWCBC (J) | Fl. USDA and Colorado Water Conservation Board representatives will outline an information program with dates for conducting meetings in the Basin. Information from local leaders will be solicited to assist in making the study relevant to their needs. Newspaper articles and other appropriate means will be used to inform local people of activities. Local leaders will be contacted to obtain information to guide study activities. |
|------------------------------------------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
- 
- |                                                           |                                |                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| II. Inventory and Assemble Information                    |                                |                                                                                                                                                                                                                                                                                                                           |
| A. Determine present use and supply of natural resources. | SCS (J)<br>FS (S)<br>CWCBC (J) | Al. Water resource inventory - consumptive use will be determined for each major use. Withdrawals, depletions, imports, and exports will be determined. All available stream information and published reports will be used to develop the water resource inventory. Water yield and precipitation maps will be prepared. |
|                                                           | SCS (J)<br>FS (J)<br>CWCBC (S) | A2. Land resource inventory - information will be developed related to physiography and geology, soils, landownership, land use, and other appropriate categories. Maps will be prepared for each item. Tabulate acreage of each SRG for each hydrologic subregion. Utilize MIADS or other systems as appropriate.        |



## MAJOR ACTIVITIES

## GENERAL PROCEDURES

### B. Determine the economic base.

ERS (P) B1. Collect and tabulate data on production,  
FS (S) inputs, prices, employment, and income  
SCS (S) for major economic sectors and income  
CWCBC (S) distribution by appropriate unit such as:  
county, hydrologic subregion, and SRG.

ERS (P) B2. Determine labor and capital use and supply.  
FS (S)  
SCS (S)  
CWCBC (S)

ERS (P) B3. Collect and tabulate social demographic  
CWCBC (S) information such as: migration, population,  
ethnic groups, etc.

ERS (J) B4. List institutional effects and relations  
FS (J) to major economic activities. Included  
SCS (J) would be zoning regulations, water compacts,  
CWCBC (J) tax structures, land use plans, etc.

### C. Determine present environmental conditions.

SCS (J) C1. List major environmental components such as  
FS (J) water quality, air quality, aesthetics,  
ERS (J) open spaces, etc. List major ecological  
CWCBC (J) systems such as alpine, forest, desertic,  
modified agricultural, etc.

SCS (J) C2. Collect and tabulate data on these  
FS (J) components and systems.  
ERS (J)  
CWCBC (J)

SCS (J) C3. Determine present perceptions of needs and  
FS (J) desired conditions. Relate perceptions to  
ERS (J) national, regional, and state expressions.  
CWCBC (J)





## MAJOR ACTIVITIES

## GENERAL PROCEDURES

- |                                                                          |                                          |     |                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------|------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| D. Identify the type, extent, location, and causes of existing problems. | SCS (J)<br>FS (J)<br>CWCB (J)            | D1. | Quantitative and qualitative descriptions of problems of the natural resources will be developed for such items as flooding, erosion, water shortages, sedimentation, water management, fish and wildlife habitat, timber and grazing management, and other categories as appropriate. |
|                                                                          | ERS (P)                                  | D2. | Quantitative and qualitative descriptions of income, employment, etc., will be discussed.                                                                                                                                                                                              |
|                                                                          | ERS (J)<br>FS (J)<br>CWCB (J)            | D3. | Quantitative and qualitative descriptions of problems related to environmental components and ecological systems will be discussed.                                                                                                                                                    |
|                                                                          | ERS (J)<br>FS (J)<br>SCS (J)<br>CWCB (J) | D4. | Maps, charts, graphs, and other appropriate means will be used to display location and extent of problems found in items D1, D2, and D3 above.                                                                                                                                         |
- 
- |                                                                                                                       |                                          |     |                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| III. Analyze information and formulate alternative assumptions concerning future economic and demographic conditions. |                                          |     |                                                                                                                                                                                                                         |
| A. Determine future demand for and supply for natural resources assuming current rates of development.                | ERS (P)<br>SCS (S)<br>FS (S)<br>CWCB (S) | A1. | Future demands for production based on current rates and trends of development will be determined by using projected shares of the market (OBERS, Type I Studies, Colorado State Water Plan, and others as applicable). |



## MAJOR ACTIVITIES

## GENERAL PROCEDURES

ERS (P) SCS (S) FS (S) CWCB (S)	A2.	Develop an analytical system to determine the use of natural resources given the demand in A1. Examples of systems to be considered are linear programming, systems analysis, etc.
ERS (P) SCS (S) FS (S) CWCB (S)	A3.	Develop an analytical system to determine the supply of products using natural resources under current rates and trends of development. This system will be integrated with A2.
ERS (J) SCS (J) FS (J) CWCB (J)	A4.	Develop primary and secondary resource production relationships relating to water, land, labor, and capital to yields of products, including such items as: sediment, solid and liquid wastes, water quality and quantity, etc.
SCS (P) FS (S) CWCB (S)	A5.	Determine suitability and availability of soil associations using information derived in Phase II, activities A, B, and C.
ERS (J) SCS (J) FS (J) CWCB (J)	A6.	Display elements and components of societal objectives assuming current rates of development.
ERS (P) SCS (S) FS (S) CWCB (S)	A7.	Develop analytical methods to show effect of current demographic and social trends on the above supply and demand analysis.
ERS (P) SCS (S) FS (S) CWCB (S)	B1.	Determine the present and future demand for natural resources considering alternative levels of demand for products and services, and resource production relationships con-
	B.	Determine future demand and supply of natural resources under alternative assumptions of future economic and demographic conditions.





## MAJOR ACTIVITIES

## GENERAL PROCEDURES

sidering the objectives of NED, EQ, and RD by modifying A1 and A2 above.

- |                                                                                                                                                           |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ERS (J)<br>SCS (J)<br>FS (J)<br>CWCB (J)                                                                                                                  | B2.                                      | Determine the present and future supply of natural resources considering alternative uses, management, combinations and development considering the objectives of NED, EQ, and RD by modifying procedures A3, A4, and A5 above.                                                                                                                                                                                       |
| ERS (J)<br>SCS (J)<br>FS (J)<br>CWCB (J)                                                                                                                  | B3.                                      | Display the elements and components of societal objectives with alternative levels of development (assuming current rates of development, NED, EQ, and RD).                                                                                                                                                                                                                                                           |
| IV. Formulate and evaluate alternative plans<br>A. Determine present and future problems and needs that can be met by no additional resource development. | ERS (J)<br>FS (J)<br>SCS (J)<br>CWCB (J) | A1.                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                           |                                          | An optimizing procedure will be developed to analyze the capabilities of the Basin to meet the needs and solve problems without additional resource development. The objective function, resource and market restraints, and production relationships will be varied to reflect changes in needs and to analyze what additional problems will develop. (This will be related to Planning Phase III, Procedure Al-A6.) |
| B. Determine present and future problems and needs that can be met by current trends in resource management and by authorized projects.                   | ERS (J)<br>FS (J)<br>SCS (J)<br>CWCB (J) | A2.                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                           |                                          | Evaluate and display beneficial and adverse effects on components of the MOP system.                                                                                                                                                                                                                                                                                                                                  |
|                                                                                                                                                           | SCS (J)<br>FS (J)<br>ERS (J)<br>CWCB (J) | B1.                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                           |                                          | Enlist assistance of other federal, state, and local agencies in obtaining information about on-going activities and authorized projects.                                                                                                                                                                                                                                                                             |



## MAJOR ACTIVITIES

### GENERAL PROCEDURES

- |    |                                          |     |                                                                                                                                                                                                                                                                                |
|----|------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | ERS (J)<br>FS (J)<br>SCS (J)<br>CWCB (J) | B2. | Use optimizing procedure in A1 above to include current trends in resource management and authorized projects.                                                                                                                                                                 |
|    | ERS (J)<br>FS (J)<br>SCS (J)<br>CWCB (J) | B3. | Evaluate and display beneficial and adverse effects on the components of the MOP system.                                                                                                                                                                                       |
| C. | ERS (J)<br>FS (J)<br>SCS (J)<br>CWCB (J) | C1. | Utilize information from on-going activities and authorized projects from USDA and other federal and local agencies in meeting needs of NED, EQ, and RD.                                                                                                                       |
|    | SCS (J)<br>FS (J)<br>ERS (J)<br>CWCB (J) | C2. | Enlist assistance of other federal, state, and local agencies in obtaining information about means of meeting components of NED, EQ, and RD. Included will be information about planned and proposed projects, identified reservoir sites, irrigation system improvement, etc. |
|    | SCS (J)<br>FS (J)<br>ERS (J)<br>CWCB (J) | C3. | Obtain information about USDA programs and potential projects as a means for meeting components of NED, EQ, and RD. Included will be WIRs, land treatment, cooperative State and Federal Programs, etc.                                                                        |
|    | ERS (J)<br>FS (J)<br>SCS (J)<br>CWCB (J) | C4. | Use optimizing procedure in A1 above to emphasize future development for NED, EQ, and RD.                                                                                                                                                                                      |
|    | ERS (J)<br>FS (J)<br>SCS (J)<br>CWCB (J) | C5. | Evaluate and display beneficial and adverse effects on the components of the MOP System.                                                                                                                                                                                       |
- C. Determine present and future problems and needs that can be met with future development to satisfy the MOP accounts emphasizing NED, EQ, and RD.





## MAJOR ACTIVITIES

## GENERAL PROCEDURES

### D. Analysis of alternative plans.

ERS (J) FS (J) SCS (J) CWCB (J)	D1.	Determine the effectiveness of given alternative plans in meeting the component needs of the MOP
ERS (J) FS (J) SCS (J) CWCB (J)	D2.	Determine the differences among alternative plans in terms of their contribution to MOP and their effects on social factors.
ERS (J) FS (J) SCS (J) CWCB (J)	D3.	Determine the relative value of those beneficial and adverse effects that are essentially presented in non-monetary terms, in terms of what is given up or traded off among plans with ranging degrees of contributions to the MOP.
ERS (J) FS (J) SCS (J) CWCB (J)	A1.	Present alternative plans to decision members as prescribed in public participation programs in Phase 1, activity F.
ERS (J) FS (J) SCS (J) CWCB (J)	A2.	Provide technical consultation and assistance in explaining the impacts of the alternative plans.
ERS (J) FS (J) SCS (J) CWCB (J)	A3.	Review and reconsider, if necessary, and formulate additional plans as appropriate.

### V. Select a Recommended Plan

#### A. Present alternative plans to decision members.



## MAJOR ACTIVITIES

B. Selection of a recommended plan.

## GENERAL PROCEDURES

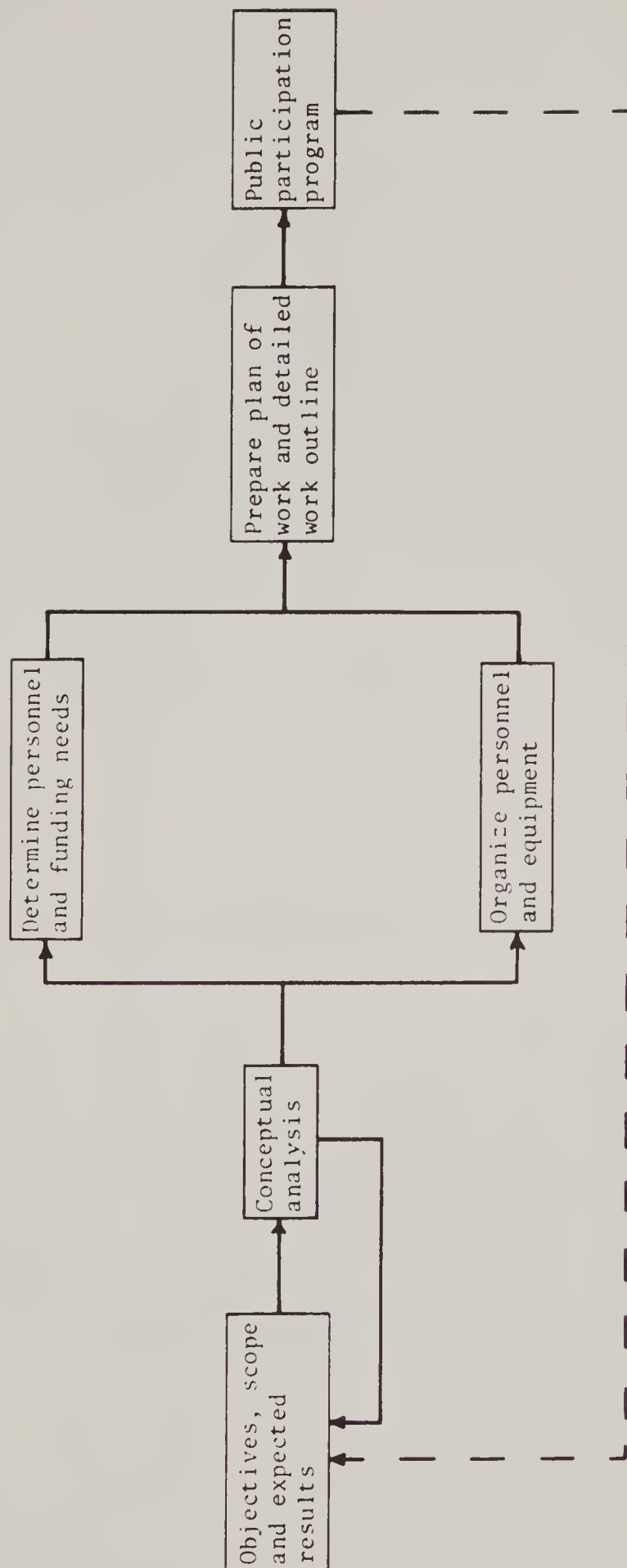
- |          |     |                                             |
|----------|-----|---------------------------------------------|
| ERS (J)  | B1. | Select a recommended plan based on          |
| FS (J)   |     | recommendations from decision makers, as to |
| SCS (J)  |     | their perceptions of priorities and         |
| CWCB (J) |     | preferences, that result in the best mix    |
|          |     | of the multi-objective.                     |
| ERS (J)  | B2. | Publish report and environmental impact     |
| FS (J)   |     | statement and present to decision makers.   |
| SCS (J)  |     |                                             |
| CWCB (J) |     |                                             |





# GENERAL WORK OUTLINE

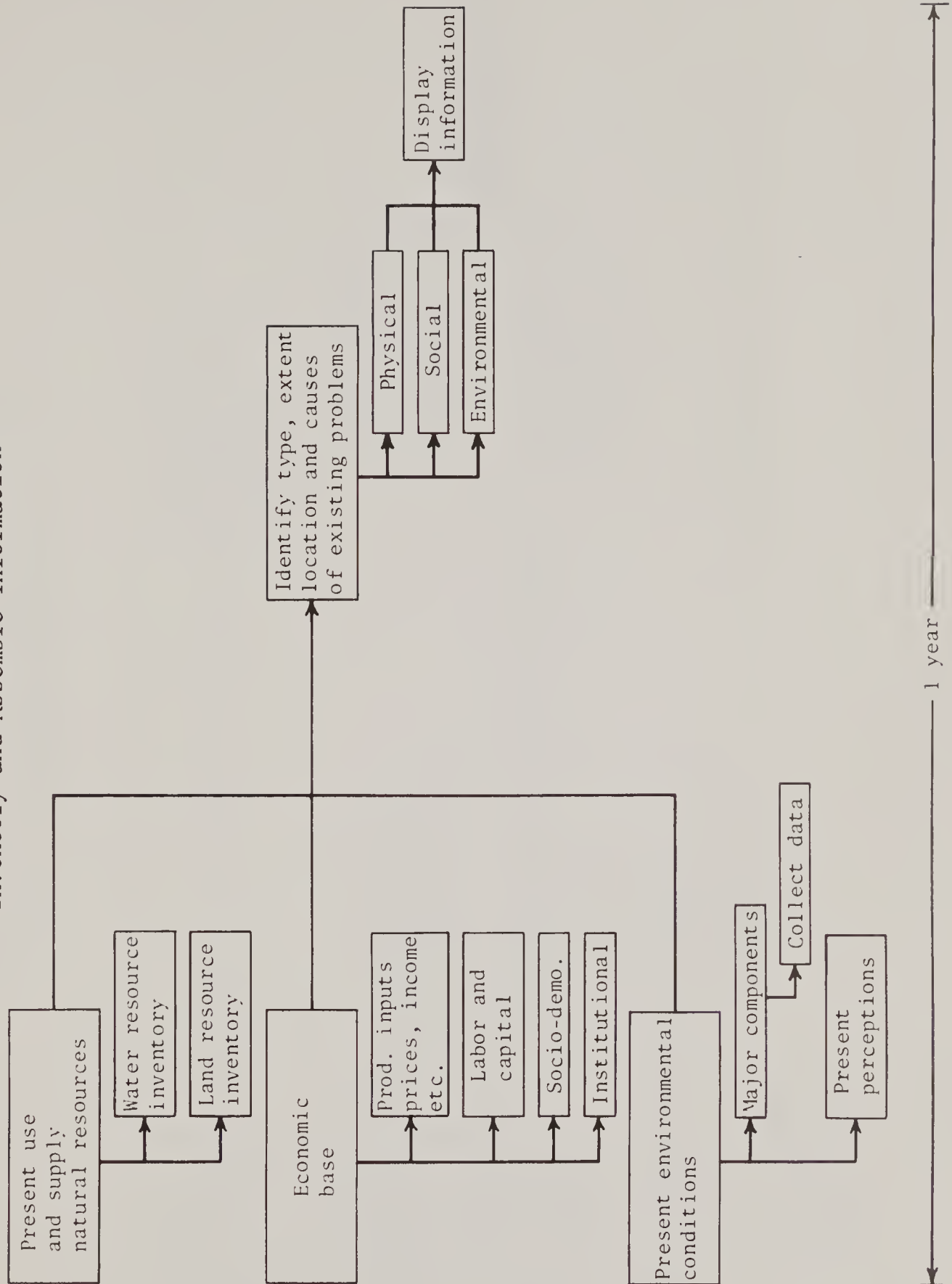
## PHASE I Organize Study



5 mo.



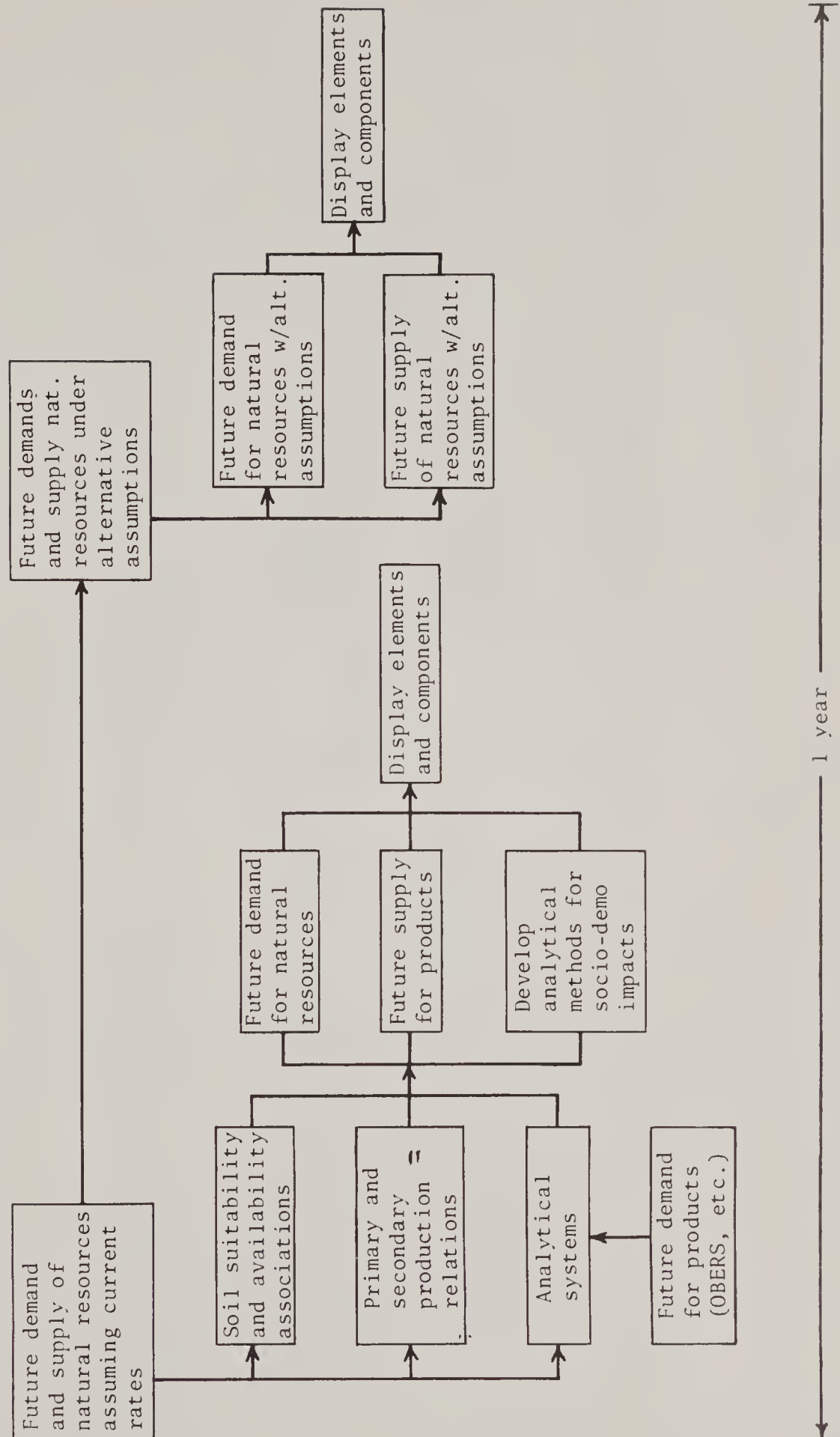
PHASE II  
Inventory and Assemble Information





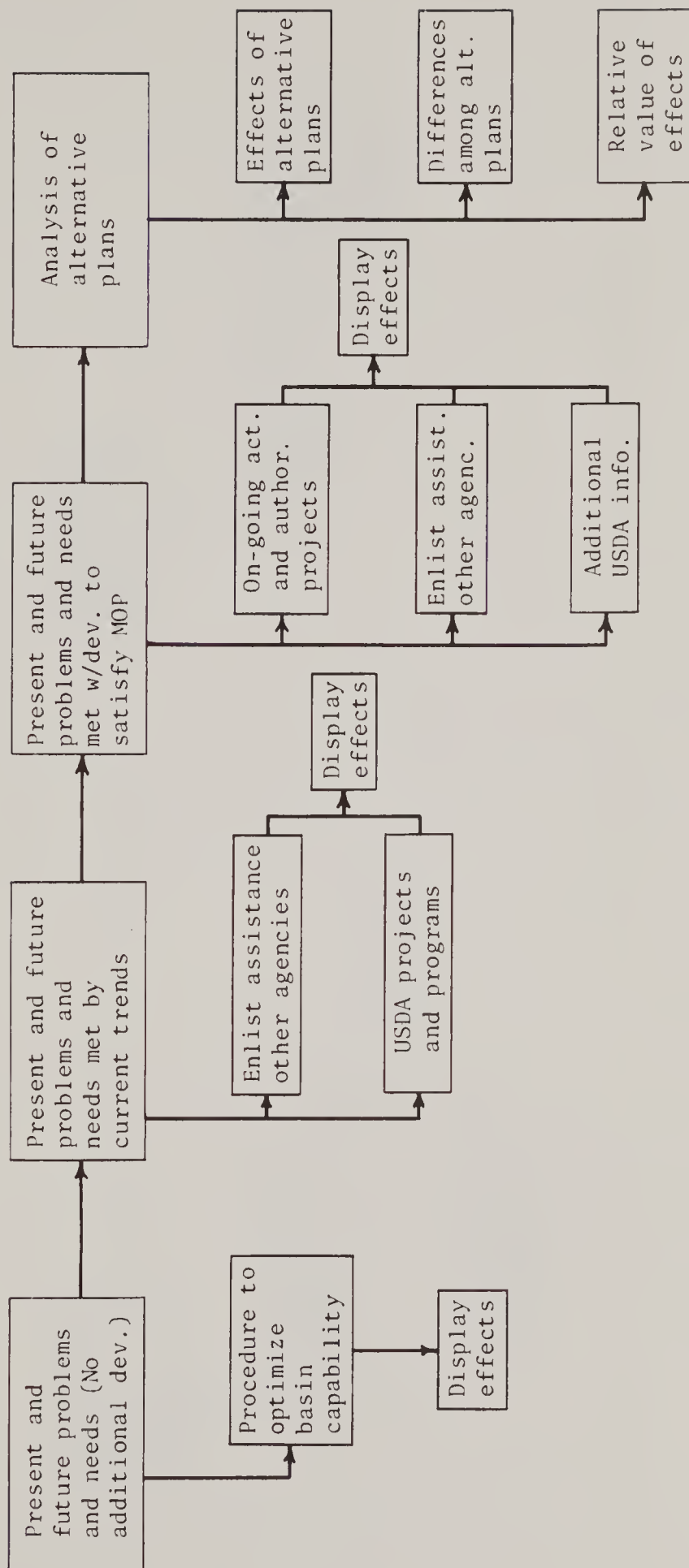


PHASE III  
 Analyze Information and Formulate Alternative  
 Assumptions Concerning Future Economic and  
 Demographic Conditions





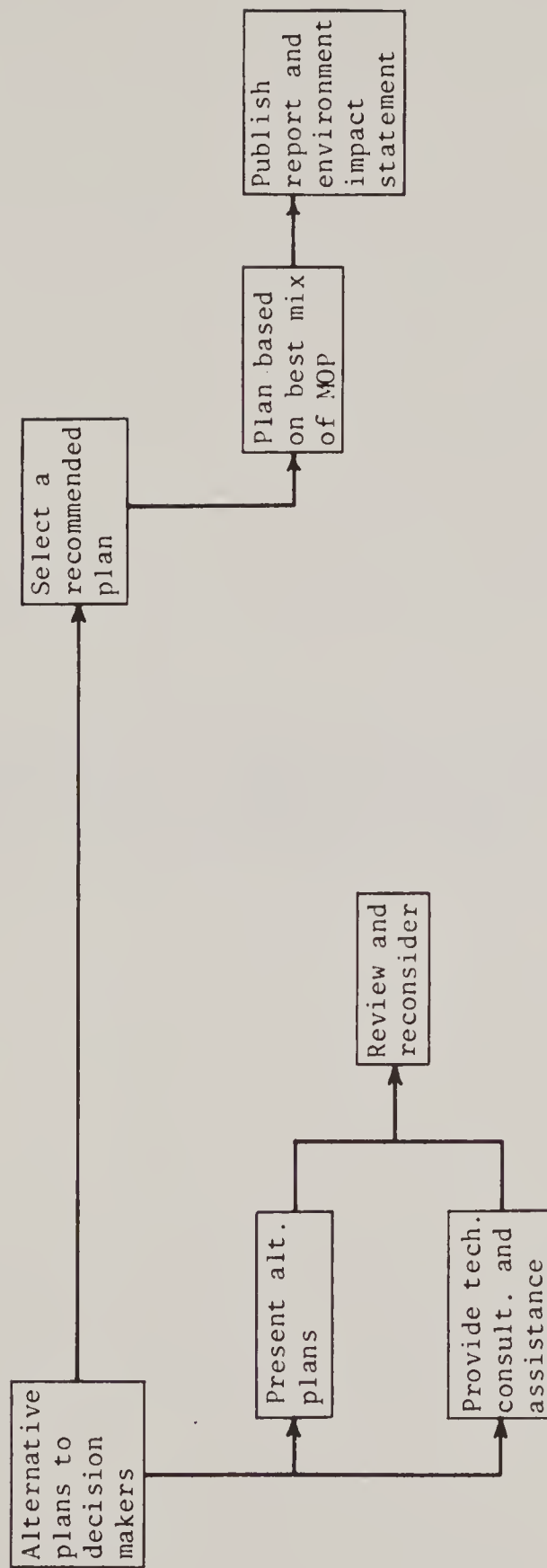
PHASE IV  
Formulate and Evaluate Alternative Plans



6 mo.



PHASE V  
Select a Recommended Plan

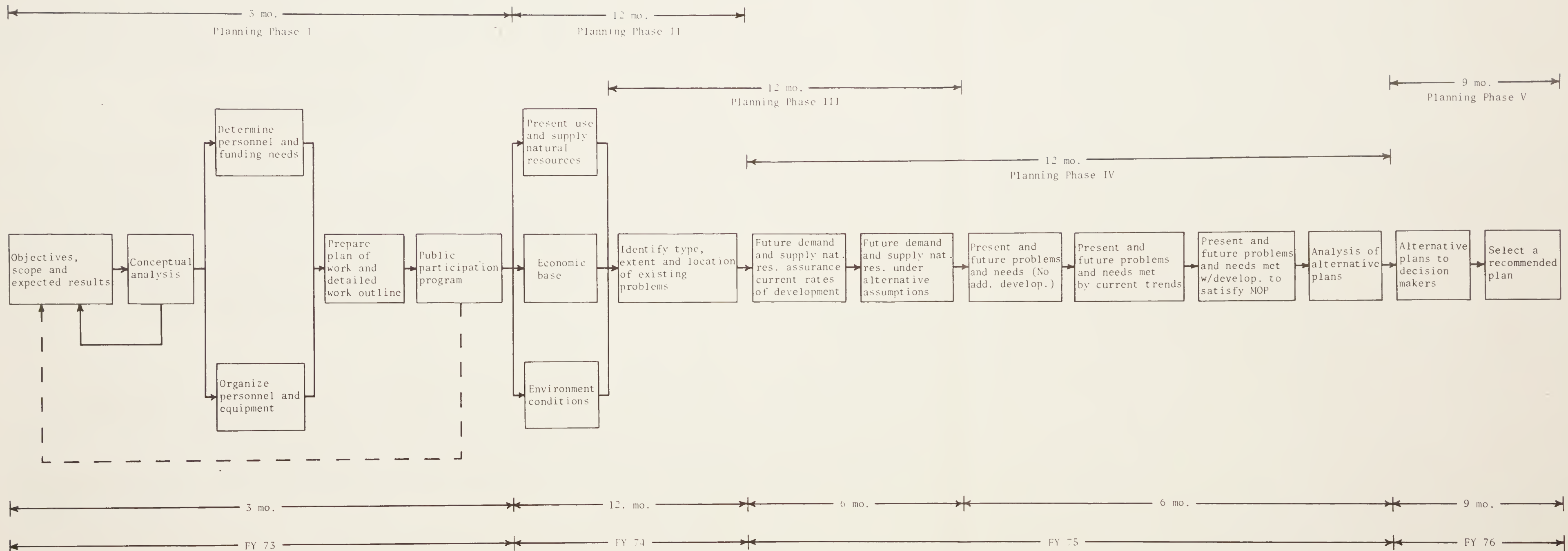


9 mo.





# PLAN FORMULATION PROCESS





## ARRANGEMENTS FOR COORDINATION

Coordination of the study between the cooperating agencies and the public will be the responsibility of the USDA Field Advisory Committee. The principal cooperating agency, outside USDA, is the Colorado Water Conservation Board but many other agencies will be involved in various phases of the study.

The Field Advisory Committee and the Colorado Water Conservation Board will arrange and conduct meetings with the public, private organizations and local leaders. The purpose of these meetings is to identify relevant problems and needs, inform the public of study progress, and obtain reactions to proposed planning alternatives.

## ADMINISTRATION OF SURVEY

### Field Advisory Committee

Survey work of the U. S. Department of Agriculture will be carried out in accordance with the Memorandum of Understanding, dated April 15, 1968, among the Economic Research Service, Forest Service, and Soil Conservation Service. It will be under the direction of a USDA Field Advisory Committee which has been established to maintain continuous close field working relationships among the three concerned Services. This Committee is composed of M. D. Burdick, Chairman, Soil Conservation Service; Frank Kopecky, Forest Service; and Ray Lanier, Economic Research Service.

### Duration of Study

The survey was initiated in FY 1971. In 1971, Multiple Objective Planning Principales were proposed for river basins surveys. The Plan of Work for the Rio Grande Basin in Colorado was revised to conform to these principles. The study is expected to be concluded at the end of FY 1976. The selection of a plan and report preparation will be completed in that year. Survey work will be accomplished concurrently with work on other river basin surveys now authorized or currently scheduled.

1/ Water Resources Council "Proposed Principles and Standards for Planning Water and Related Land Resources," Federal Register, Vol. 36, No. 245, December 21, 1971.





Funding (Subject to the availability of funds).

	<u>TOTAL</u>	<u>FY 1973</u>	<u>FY 1974</u>	<u>FY 1975</u>	<u>FY 1976</u>
USDA					
SCS		(70,000)	(90,000)	(100,000)	(50,000)
FS		(17,000)	(29,000)	( 30,000)	(19,000)
ERS		(48,000)	(45,500)	( 35,500)	(25,000)
State		38,000	38,000	38,000	38,000
Colorado					

PROGRESS REPORT

Narrative progress reports will be submitted quarterly by the Field Party to the Chairman, USDA Field Advisory Committee. These reports will cover each planning phase of the study, the amount of work accomplished, major problems encountered and progress with regard to the overall study schedule.

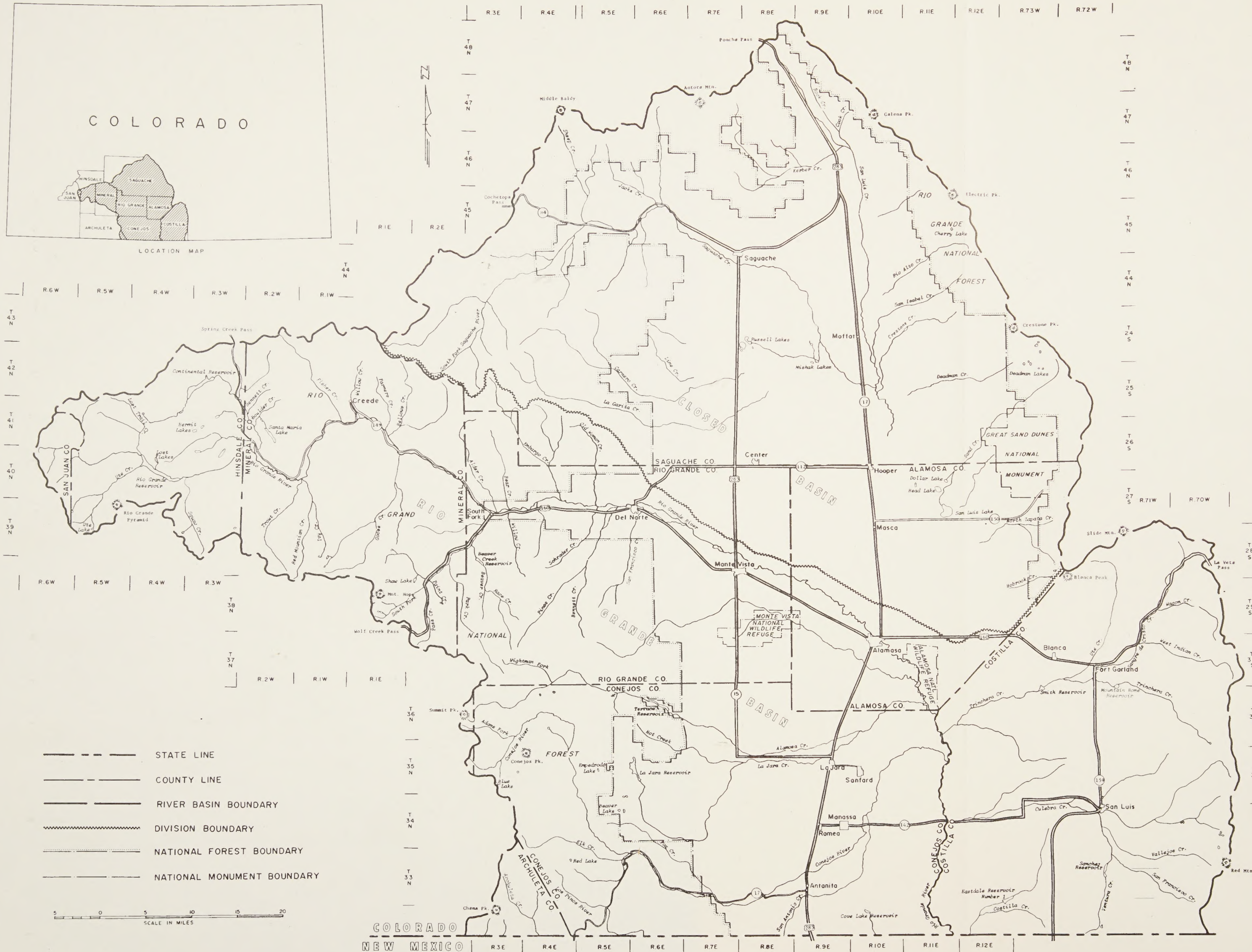
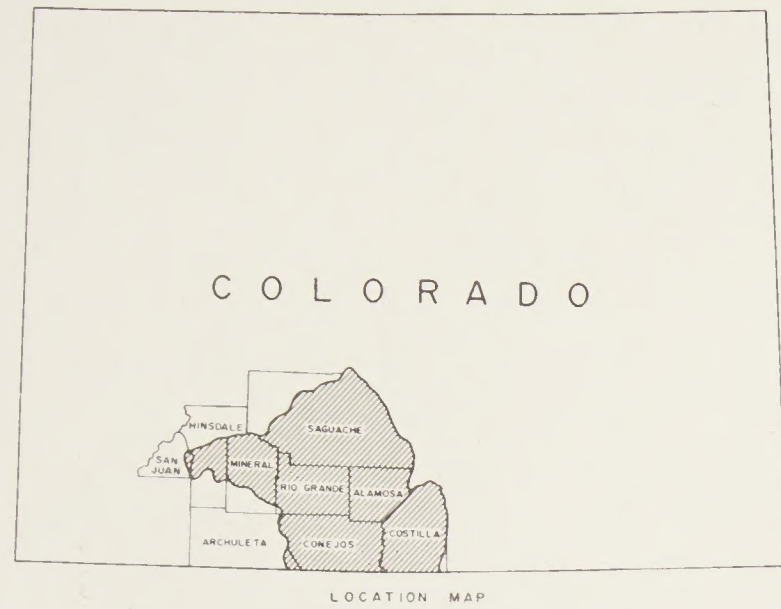


## SCHEDULE OF PLANNED ACTIVITIES

- Fiscal Year 1972 - Revise plan of work incorporating the Multiple Objective Planning principles as outlined in the Proposed Principles and Standards of Planning Water and Related Land Resources by the Water Resources Council.
- Fiscal Year 1973 - Conceptually analyze the Basin and data that will be needed. Specify relationships needed to address the objectives of the study. Identify methods of analysis, components, and information that will be needed. Develop a public participation program. Conduct meetings in the Basin to obtain information from local leaders on possible study elements to make the study relevant to their needs.
- Fiscal Year 1974 - Determine the present use and supply of natural resources, the economic base and present environmental conditions. Identify the type, extent, location and causes of existing problems. Begin studies to determine the future demand and supply of natural resources assuming current rates of development.
- Fiscal Year 1975 - Complete studies for determining future demand and supply of natural resources assuming current rates of development. Also initiate and complete studies for determining future demands and supplies of natural resources under alternative assumptions of future economic and demographic conditions. Formulate and evaluate alternative plans for meeting societal objectives.
- Fiscal Year 1976 - Present alternative plans to decision makers and select a plan based on the best mix of the multiple objectives. Publish report and develop an environmental impact statement.







RIO GRANDE BASIN  
IN  
COLORADO







